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TRANSMITTAL OF APPEAL BRIEF

Docket No.
W0550.70000US00

In re Application of: Anthony J. Griggs et al.

Application No.	Filing Date	Examiner	Group Art Unit
10/687861-Conf. #9578	October 17, 2003	K. Bahta	2125

Invention: APPARATUS AND METHOD FOR DIMENSIONAL METROLOGY

TO THE COMMISSIONER OF PATENTS:

Transmitted herewith is the Appeal Brief in this application, with respect to the Notice of Appeal filed: May 23, 2006 .

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[x] Large Entity [ ] Small Entity

[ ] A petition for extension of time is also enclosed.

The fee for the extension of time is _____ .

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This sheet is submitted in duplicate.

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Dated: July 24, 2006

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Dated: July 24, 2006 Signature: Janine Michalski (Janine Michalski)

PTO/SB/17 (12-04v2)
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Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 500.00

Complete if Known	
Application Number	10/687861-Conf. #9578
Filing Date	October 17, 2003
First Named Inventor	Anthony J. Griggs
Examiner Name	K. Bahta
Art Unit	2125
Attorney Docket No.	W0550.70000US00

METHOD OF PAYMENT (check all that apply)

☒ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☐ Deposit Account Deposit Account Number: 23/2825 Deposit Account Name: Wolf, Greenfield & Sacks, P.C.

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
		Small Entity		Small Entity		Small Entity	
Application Type	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - 20 =	_____	x _____	= _____

Multiple Dependent Claims	
Fee ($)	Fee Paid ($)
_____	_____

Indep. Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - 3 =	_____	x _____	= _____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
_____ - 100 =	_____	/50 _____ (round up to a whole number) x	_____	= _____

4. OTHER FEE(S) **Fees Paid ($)**

Non-English Specification, $130 fee (no small entity discount)

Other (e.g., late filing surcharge): 2402 Filing a brief in support of an appeal 500.00

SUBMITTED BY

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Dated: July 24, 2006 Signature: Janine Michalski (Janine Michalski)

Docket No.: W0550.70000US00
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors:	Anthony J. Griggs et al.
Serial No.:	10/687861
Confirmation No.:	9578
Filed:	October 17, 2003
For:	APPARATUS AND METHOD FOR DIMENSIONAL METROLOGY
Examiner:	K. Bahta
Art Unit:	2125

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Dated: July 24, 2006

Janice Michalski

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

As required under § 41.37(a), this brief is being filed within two months of the date of filing the Notice of Appeal, May 23, 2006, and is in furtherance of said Notice of Appeal.

The fees required under § 41.20(b)(2) are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1206:

I.	Real Party In Interest
II	Related Appeals and Interferences
III.	Status of Claims
IV.	Status of Amendments
V.	Summary of Claimed Subject Matter
VI.	Grounds of Rejection to be Reviewed on Appeal

VII. Argument
VIII. Claims
IX. Evidence
X. Related Proceedings
Appendix A Claims

I. REAL PARTY IN INTEREST (37 C.F.R. §41.37(c)(1)(i))

The real party in interest for this appeal is Hexagon Metrology AB, a Swedish corporation having a place of business at Europa House, Church Street, Old Isleworth, Middlesex TW7 6BD, United Kingdom, the current Assignee of record. The inventors of record assigned all of their rights in the invention to Hexagon Metrology AB in an assignment recorded in the United States Patent and Trademark Office on April 19, 2004, at Reel 015224, Frame 0731.

II. RELATED APPEALS, INTERFERENCES, AND JUDICIAL PROCEEDINGS (37 C.F.R. §41.37(c)(1)(ii))

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS (37 C.F.R. §41.37(c)(1)(iii))

A. Total Number of Claims in Application

This appeal involves all of the claims pending in the application, claims 1-93 (13 independent claims and 80 dependent claims), all of which stand finally rejected under 35 U.S.C. §102(e).

B. Current Status of Claims

1. Claims canceled: None

2. Claims withdrawn from consideration but not canceled: None

3. Claims pending: 1-93

4. Claims allowed: None

5. Claims rejected: 1-93

C. Claims On Appeal

Claims 1-93 are on appeal and are reproduced in Appendix A.

IV. STATUS OF AMENDMENTS (37 C.F.R. §41.37(c)(1)(iv))

No amendments to the claims have been made during the prosecution of this application.

V. SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. §41.37(c)(1)(v))

Appellant's invention relates to the generation of coordinate measurement programs for machine tools and/or execution of coordinate measurement programs on machine tools. (Page 1, lines 5-7).

Dimensional metrology is used to measure the conformity of a workpiece to its intended design. Coordinate measurement machines (CMMs), both contact and non-contact, have been used to gather dimensional data on the location of points, edges, planes, surfaces and other part features. (Page 1, lines 10-13).

Outfitted with a sensor, a CMM can be controlled by a CMM application to measure numerous points on a workpiece and to provide enough raw data to investigate the dimensional metrology of the manufactured piece and its features. As illustrated in Fig. 1, a CMM application running on a computer (102) issues commands that control the movements and measurements performed by a CMM (104). Typically, the control of the CMM is interactive, that is, measurement data returned by the CMM is analyzed by the CMM application, and subsequent commands provided by the CMM application are based on an analysis of the returned measurement data. Historically, CMM investigations (e.g., using a CMM and a CMM application running on a computer) have been performed off-line, that is, away from the machine shop floor and in an area with a well-controlled environment. As such, CMMs were used more for quality assurance, rather than in-process as part of manufacturing process control. (Page 1, lines 17-29).

More recently, there has a been a move toward integrating coordinate metrology into the manufacturing process. As part of this trend, CMMs are being moved to the shop floor and

used between manufacturing steps to analyze parts and processes. Even with CMMs integrated into the manufacturing process, however, the act of removing a workpiece from a machine tool and fixturing it in a CMM for coordinate measurement can cause undesirable delays and changes to workpiece geometry. (Page 1, line 30 - Page 2, line 8).

Because of these delays and problems associated with moving in-line parts to CMMs for coordinate measurement, an even more recent trend has been to perform coordinate measurement while workpieces remain fixtured in a machine tool. In some cases, non-contact methods, such as scanning are used. In other examples, contact methods are used, in which the machine tool is outfitted with a separate sensor which is operated in a manner similar to a CMM to perform measurements on the workpiece. (Page 2, lines 13-19).

Appellants have provided a method of generating a machine tool program that is executable directly on a machine tool controller to control the machine tool itself to perform the desired coordinate measurements. The machine tool program may be generated from a dimensional metrology program. (Page 4, line 2-5). In some embodiments, the dimensional metrology program from which the machine tool program is generated is a program originally configured to control a CMM. (Page 34, lines 13-14).

Independent claim 1 is directed to a method of generating a machine tool program (306) from a dimensional metrology program (304). The machine tool program (306) includes instructions to control a machine tool (312) to perform coordinate measurements, and the machine tool program (306) is executable on a machine tool controller (308). (Page 4, lines 2-5; page 10, line 27 - page 11, line 7; page 12, lines 17-19;Figs. 3 and 4).

Independent claim 28 is directed to a program generator (302) to generate, from a dimensional metrology program (304), a machine tool program (306) including instructions to control a machine tool (312) to perform coordinate measurements. (Page 4, lines 6-9; page 10, line 27 - page 11, line 7; page 12, lines 17-19; Figs. 3 and 4).

Independent claim 31 is directed to a computer-readable medium (1201, 1202) having instructions stored thereon that, as a result of being executed by a computer (1100), instruct the computer (1100) to perform a method comprising an act of generating, from a dimensional metrology program (304), a machine tool program (306) including instructions to control a machine tool (312) to perform coordinate measurements, wherein the machine tool program (306) is executable on a machine tool controller (308). (Page 4, lines 10-15; page 10, line 27 -

page 11, line 7; page 12, lines 17-19; page 29, line 8 - page 30, line 9; Figs. 3, 4 and 11-12).

Independent claim 55 is directed to a system comprising means for generating a machine tool program from a dimensional metrology program. The structure corresponding to the function of generating a machine tool program to control a machine tool to perform coordinate measurements includes a program generator (302, 804) configured to perform one or more of the acts described on page 17, line 10 - page 19, line 12. For example, the acts corresponding to the means for generating a machine tool program may include one or more of: translating a dimensional metrology program; removing commands from a dimensional metrology program; mapping dimensional metrology move commands to NC move commands; mapping dimensional metrology probing cycle commands to NC program subroutines; inserting into the machine tool program additional commands not found in the dimensional metrology program; altering speed and/or path commands in the machine tool program as compared to the dimensional metrology commands; and inserting commands into the machine tool program that allow for dual-hit probing. The generated machine tool program (306, 806) includes instructions to control a machine tool (312, 812) to perform coordinate measurements, wherein the machine tool program (306, 806) is executable on a machine tool controller (308, 804). The system further comprises a communication module (810) to communicate the machine tool program (806) to the machine tool controller (804). (Page 4, lines 16-21; page 10, line 27 - page 11, line 7, page 12, lines 17-19; Page 24, lines 8-14; Figs. 4 and 8).

Independent claim 57 is directed to a method comprising generating a machine tool program that includes instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller. (Page 4, lines 22-26; page 17, line 10 - page 19, line 5; Figs. 3 and 4). The method further comprises analyzing coordinate measurement data generated by execution of the machine tool program using dimensional metrology analysis. (Page 4, lines 24-25; page 20, lines 14-18; Figs. 3 and 4).

Independent claim 76 is directed to a system comprising a program generator (302) to generate a machine tool program (306) including instructions to control a machine tool (312) to perform coordinate measurements, wherein the machine tool program (304) is executable on a machine tool controller (308). (Page 4, lines 27-30; page 17, line 10 - page 19, line 5; Figs. 3 and 4). The system also comprises a dimensional metrology analysis module to analyze coordinate

measurement data generated by an execution of the machine tool program. (Page 4, line 30 - page 5, line 2; page 10, lines 17-26; page 20, lines 14-18; Figs. 3 and 4).

Independent claim 77 is directed to a computer-readable medium (1201, 1202) having instructions stored thereon that, as a result of being executed by a computer (1100), instruct the computer (1100) to perform a method comprising generating a machine tool program (306) including instructions to control a machine tool (312) to perform coordinate measurements, wherein the machine tool program (306) is executable on a machine tool controller (308). (Page 5, lines 3-7; page 10, line 27 - page 11, line 7; page 12, lines 17-19; page 29, line 8 - page 30, line 9; Figs. 3, 4 and 11-12). The method further comprises analyzing coordinate measurement data generated by an execution of the machine tool program (306) using dimensional metrology analysis (322). (Page 5, lines 7-9; page 10, lines 17-26; page 20, lines 14-18; Figs. 3 and 4).

Independent claim 78 is directed to a system comprising means for generating a machine tool program including instructions to control a machine tool (312) to perform coordinate measurements, wherein the machine tool program (306) is executable on a machine tool controller (308). (Page 10, lines 10-14). The structure corresponding to the function of generating a machine tool program to control a machine tool to perform coordinate measurements includes a program generator (302, 804) configured to perform one or more of the acts described on page 17, line 10 - page 19, line 12. For example, the acts corresponding to the means for generating a machine tool program may include one or more of: translating a dimensional metrology program; removing commands from a dimensional metrology program; mapping dimensional metrology move commands to NC move commands; mapping dimensional metrology probing cycle commands to NC program subroutines; inserting into the machine tool program additional commands not found in the dimensional metrology program; altering speed and/or path commands in the machine tool program as compared to the dimensional metrology commands; and inserting commands into the machine tool program that allow for dual-hit probing. It should be noted that claim 78 does not recite that the means for generating a machine tool program must generate the machine tool program from a dimensional metrology program. Therefore the program generator need not receive a dimensional metrology program (304) as part of the means for generating a machine tool program. The system further comprises a dimensional metrology analysis module (322) to analyze coordinate measurement data generated by execution of the machine tool program (306). (Page 10, lines 12-14; page 10, lines 17-26;

page 20, lines 14-18; Figs. 3 and 4).

Independent claim 79 is directed to a method comprising generating, from a dimensional metrology program (304), a self-contained machine tool program (306) that is executable on a machine tool controller (308) to perform coordinate measurements without interaction with a program generator (302). (Page 5, line 15-18; page 17, lines 16-22; Figs. 3 and 4).

Independent claim 84 is directed to a method comprising generating, from a dimensional metrology program (304), a machine tool program (306) including instructions to control a machine tool (312) to perform coordinate measurements, wherein generating the machine tool program (306) is performed independently from any measurement data received from a machine tool controller (308). (Page 5, lines 19-23).

Independent claim 86 is directed to a method comprising generating, from a dimensional metrology program (304), a machine tool program (306) including instructions to control a machine tool (312) to perform coordinate measurements, and providing at least one indicator within the machine tool program to be used by a dimensional metrology analysis module to analyze data generated by execution of the machine tool program. (Page 5, lines 24-29; page 19, lines 13-20).

Independent claim 92 is directed to a computer-readable medium (1201, 1202) having instructions stored thereon that, as a result of being executed by a computer (1100), instruct the computer (1100) to perform a method comprising generating, from a dimensional metrology program (304), a machine tool program (306) including instructions to control a machine tool (312) to perform coordinate measurements. The method further comprises providing at least one indicator within the machine tool program (306) to be used during dimensional metrology analysis (322) to analyze data generated by execution of the machine tool program. (Page 5, line 30 - page 6, line 6; page 19, lines 13-20; page 23, lines 7-18).

Independent claim 93 is directed to a system comprising a program generator (302) to generate, from a dimensional metrology program (304), a machine tool program (306) including instructions to control a machine tool (312) to perform coordinate measurements, wherein the machine tool program (306) comprises means for indicating to a dimensional metrology analysis module the type of analysis to be performed. (Page 6, lines 7-11). The structure corresponding to the function of indicating to a dimensional metrology analysis module (322, 814) the type of

analysis to be performed includes indicators that are included in the machine tool program. (Page 23, lines 7-10). These indicators may be passed through to data (320) that is sent to the analysis module. (Page 13, lines 13-15).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. §41.37(c)(1)(vi))

Whether claims 1-93 are anticipated under 35 U.S.C. §102(e) by U.S. Patent No. 6,671,571 to Matsumiya et al. (hereinafter "Matsumiya").

VII. ARGUMENT (37 C.F.R. §41.37(c)(1)(vii))

The Appellant respectfully requests that the Examiner's final rejection of all the claims be reversed. The claims as presented are believed to be in allowable condition.

A. DISCUSSION OF MATSUMIYA

The system described in Matsumiya is an example of a prior art manufacturing system described above in which a machine tool is used to machine a workpiece, and then the workpiece is removed from the machine tool and placed in a CMM for performing measurements on the workpiece. For example, Fig. 1 of Matsumiya schematically illustrates a workpiece 30 being transferred from a machine tool 26 to a measuring machine 31 for measurement. Additionally, Matsumiya states at column 4, lines 57-61, "[w]hen the process machining for the workpiece 30 in the first chucking attitude has been completed, a measuring machine 31 executes coordinate measurement of the workpiece 30 according to the measurement program of a measurement control apparatus 32" (emphasis added). This clearly shows that a measuring machine using its own measurement control apparatus performs coordinate measurement in the system of Matsumiya rather than a machine tool, as in the present invention. Further, Fig. 9 shows the measuring machine 31 and the machine tool 26 as separate and separately controlled components.

As stated in column 5, lines 16-19, Matsumiya is directed to supplying a measurement program to a measurement control apparatus of a measuring machine, the measurement program having been produced from a machining NC program. In contrast, claims of the present

application are directed to generating a machine tool program which includes instructions to control a machine tool to perform coordinate measurements. In some claims, the machine tool program is recited as being generated from a measurement program originally intended for use with a coordinate measuring machine. In some claims, the machine tool program is recited as being executable on a machine tool controller.

B. REJECTION UNDER 35 U.S.C. §102(e) OVER MATSUMIYA

For the reasons discussed below, a *prima facie* case of anticipation has not been established. To be anticipating, a prior art reference must disclose each and every limitation of the claimed invention. (Helifix Limited v. Blok-Lok Ltd., 208 F.3d 1339 at 1346, 54 U.S.P.Q.2d 1299 at 1303 (Fed. Cir. 2000)). There is no claim currently pending in this application for which Matsumiya teaches each and every claim element. Therefore the claims are not anticipated by Matsumiya.

Furthermore, Matsumiya fails to even suggest the claim elements that are not expressly or inherently found. No additional references have been cited in the Office Action to cure the deficiencies of Matsumiya. Thus, the claims are not obvious over Matsumiya.

1. Independent claims 1, 31, 86, and 92 and dependent claims 3-6, 8-13, 15, 16, 18-20, 23-26, 33-36, 38-45, 47, 48, 50-53, and 87-91.

Each of claims 1 and 86 recite a method comprising generating, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements. Claim 31 and claim 92 each recite a computer-readable medium having instructions stored thereon, that, as a result of being executed by a computer, instruct the computer to perform the method of claim 1 and claim 86, respectively. In contrast, Matsumiya teaches performing coordinate measurements only on a prior art measuring machine. There is no teaching or suggestion whatsoever in Matsumiya to generate a machine tool program that includes instructions to control a machine tool to perform coordinate measurements, directly contrary to the assertion in paragraphs 2 and 3 of the Final Office Action dated December 2, 2005. For example, Fig. 2 of Matsumiya and the associated description in column 7, lines 1-3 show that in one embodiment, Matsumiya describes producing a measurement program (50)

which is supplied to a measurement control apparatus (32). Control apparatus (32), as can be seen in Fig. 1, only controls a measuring machine (31).

Paragraph 3 of the Office Action dated December 2, 2006 ("Response to Arguments") states that Matsumiya discloses the claimed invention, and points to the text in column 4, lines 57-65 as disclosing a machine controller executing a machine tool program to produce coordinate measurement data. This interpretation of Matsumiya is incorrect, as is apparent from a careful reading of the text:

> When the process machining for the workpiece 30 in the first chucking attitude has been completed, a measuring machine 31 executes coordinate measurement of the workpiece 30 according to the measurement program of a measurement control apparatus 32. The measured results are fed back to the NC program execution means 27 of the NC apparatus 25 in the next process via a measurement result analyzing means 33, and are supplied to the respective databases, 21A, 21,B, 21C, 21D, and 21E, as necessary.

Rather than disclosing that a machine tool controller executes a machine tool program to produce coordinate measurement data, lines 57-65 of column 4 of Matsumiya describe a measurement control apparatus controlling a measuring machine 31 to perform coordinate measurement. While a separate machine tool controller (NC program execution means 27) exists, it is clear that this machine tool controller does not execute a machine tool program to produce coordinate measurement data.

Additionally, Matsumiya does not include any teaching or suggestion of generating a machine tool program from a dimensional metrology program. Matsumiya only describes machine tool programs (for machining operations) which are produced in part based on measurement data received from a measuring machine, as illustrated in Fig. 9. In Matsumiya, the measuring machine provides only measurement data to the machine tool controller, and not a measurement program, and therefore any generated machine tool program in Matsumiya is not generated from a dimensional metrology program.

In view of the foregoing, Appellant respectfully requests reconsideration and withdrawal of the Examiner's final rejections under 35 U.S.C. §102(e) of independent claims 1, 31, 86 and 92, and dependent claims 3-6, 8-13, 15, 16, 18-20, 23-26, 33-36, 38-45, 47, 48, 50-53, and 87-91.

2. Dependent Claims 2 and 32

Claim 2 depends from claim 1 and claim 32 depends from claim 31, and both recite that the machine tool controller executes the machine tool program to produce coordinate measurement data. The Office Action states that element 51 of Matsumiya teaches this feature. In Fig. 2, reference numeral 51 points to a box labeled, "Coordinate Systems From Machine Tool". While reference numeral 51 is not found in the specification of Matsumiya, a conversion division 43 converts "the coordinate systems prepared for NC machining to the three-dimensional coordinate systems for measurement." (Column 6, lines 40-43). Element 51 therefore is the definition of the coordinate system of a machine tool rather than measurement data produced by executing a machine tool program to perform coordinate measurements. Accordingly, Matsumiya does not teach or suggest executing a machine tool program to produce coordinate measurement data. In addition to the reasons already set forth above for claims 1 and 31, withdrawal of the rejections of claims 2 and 32, respectively, is respectfully requested for the reasons set forth in this section.

3. Dependent Claims 7 and 37

Claim 7 depends from claim 6 and claim 37 depends from claim 36, and both recite that an additional machine tool program comprises instructions to control a machine tool to perform coordinate measurements. The Office Action asserts that Fig. 2 teaches this feature. As discussed above, Matsumiya does not teach or suggest a machine tool program that includes instructions to control a machine tool to perform coordinate measurements. In addition to the reasons already set forth above for claims 1 and 31, withdrawal of the rejections of claims 7 and 37, respectively, is respectfully requested for the reasons set forth in this section.

4. Dependent Claims 14 and 46

Claim 14 depends from claim 1 and claim 46 depends from claim 31, and both recite that the generation of the machine tool program is performed by an application integrated within a control panel of the machine tool controller. The Office Action states that Fig. 9 teaches this feature. Neither Fig. 9 nor its description in the specification teach generating a machine tool program (of any kind) by an application integrated within a control panel of the machine tool

controller. In fact, Fig. 1 and its description indicate that an NC program producing means (20) is separate from an NC apparatus (25). In addition to the reasons already set forth above for claims 1 and 31, withdrawal of the rejections of claims 14 and 46, respectively, is respectfully requested for the reasons set forth in this section.

5. Dependent Claim 17

Claim 17 depends from claim 15, which depends from claim 1, and recites that generation of the machine tool program comprises combining a machine definition with a dimensional metrology path definition. Fig. 4A is stated to teach this feature in the Office Action. Fig. 4A shows an NC machining program which includes tolerance information, but the machining program does not include a dimensional metrology path definition, nor is the machining program of Fig. 4A formed from a dimensional metrology path definition. Fig. 1 of Matsumiya shows a number of different inputs to NC Program Producing Means (20), but none of them includes a dimensional metrology path definition. Accordingly, Matsumiya does not teach or suggest combining a machine definition with a dimensional metrology path definition when generating a machine tool program. In addition to the reasons already set forth above for claim 1 above, withdrawal of the rejection of claim 17 is respectfully requested for the reasons set forth in this section.

6. Dependent Claim 21

Claim 21, which depends from claim 1, recites that the generation of a machine tool program from a dimensional metrology program comprises translating the dimensional metrology program into the machine tool program. The Office Action states that elements 25 and 26 teach this claim feature. There is no teaching whatsoever in Matsumiya that NC apparatus (25) or machine tool (26) translate a dimensional metrology program into a machine tool program. Instead, as discussed above, Matsumiya uses elements of a machine tool program (which is designed to machine a part) to produce a measurement program to be supplied to a measurement control apparatus. (See column 5, lines 16-19 or Matsumiya). In addition to the reasons already set forth above for claim 1 above, withdrawal of the rejection of claim 21 is respectfully requested for the reasons set forth in this section.

7. Dependent Claims 22 and 49

Claim 22 depends from claim 1 and claim 49 depends from claim 31, and both recite that the generation of the machine tool program comprises removing dimensional metrology program commands from the dimensional metrology program. The Office Action states that Fig. 2 teaches this claim feature. The only possible dimensional metrology program shown in Fig. 2 is measurement program (50) which is not shown or described as having dimensional metrology program commands removed as part of generating a machine tool program. Accordingly, withdrawal of the rejections of claims 22 and 49 is respectfully requested for at least this reason in addition to the reasons already set forth above for claims 1 and 31 respectively.

8. Dependent Claims 27 and 54

Claim 27 depends from claim 1 and claim 54 depends from claim 31, and both recite that the generation of a machine tool program comprises providing indicators within the machine tool program, the indicators including information regarding a quantity of coordinate measurements associated with a workpiece feature. The Office Action states that Column 6, lines 26-43 of Matsumiya teaches this claim feature. Contrary to the statement in the Office Action, this text does not address the quantity of coordinate measurements associated with a workpiece feature. Instead it describes the extraction of quality information from an NC machining program. The number of measurements to be taken for a given workpiece feature is not discussed at all. Accordingly, withdrawal of the rejections of claims 27 and 54 is respectfully requested for at least this reason in addition to the reasons already set forth above for claims 1 and 31 respectively.

9. Dependent Claim 91

Claim 91 depends from claim 86 and recites that the at least one provided indicator comprises information regarding a quantity of coordinate measurements associated with a workpiece feature. Once again, the Office Action looks to Column 6, lines 26-43 of Matsumiya. As before, this portion of Matsumiya does not address the quantity of coordinate measurements associated with a workpiece feature, but instead describes the extraction of quality information

from an NC machining program. The number of measurements to be taken for a given workpiece feature is not discussed. Accordingly, withdrawal of the rejection of claim 91 is respectfully requested for at least this reason in addition to the reasons already set forth above for claim 86.

10. Independent Claims 28 and 93, and Dependent Claims 29-30

Each of independent claims 28 and 93 recites a program generator to generate, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements. It is stated in the Office Action that column 6, line 63 - column 7, line 3 of Matsumiya shows this limitation. While this portion of Matsumiya explains some of the steps included in the process of producing a measuring program for a measurement control apparatus (32), it says nothing about a machine tool. There is no suggestion whatsoever in Matsumiya to generate a machine tool program that instructs a machine tool to perform coordinate measurements, and therefore withdrawal of the rejections of claims 28-30 and 93 is respectfully requested.

11. Independent Claim 55 and Dependent Claim 56

Claim 55 recites, among other features, a system comprising means for generating a machine tool program from a dimensional metrology program, the machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller.

As discussed above, Matsumiya does not teach or suggest a machine tool program that includes instructions to control a machine tool to perform coordinate measurements. Therefore, withdrawal of the rejections of claim 55 and 56 is respectfully requested.

12. Independent Claims 57, 76, and 77 and Dependent Claims 59-61, 63, 64, 66-68 and 71-75

Claim 57 is directed to a method comprising two acts. One act includes generating a machine tool program that includes instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller.

Another act comprises analyzing coordinate measurement data generated by execution of the machine tool program using dimensional metrology analysis.

Claim 76 is directed to a program generator to generate a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller. The system also comprises a dimensional metrology analysis module to analyze coordinate measurement data generated by an execution of the machine tool program.

Claim 77 is directed to a computer-readable medium having instructions stored thereon that, as a result of being executed by a computer, instruct the computer to perform a method comprising the acts recited in claim 57.

As discussed above, Matsumiya does not teach or suggest generating a machine tool program that includes instructions to control a machine tool to perform coordinate measurements, nor does Matsumiya teach or suggest analyzing coordinate measurement data that was generated by an execution of such a machine tool program. Accordingly, withdrawal of the rejections of claims 57, 59-61, 63, 64, 66-68, and 71-77 is respectfully requested.

13. Dependent Claim 58

Claim 58 is directed to the method of claim 57 and further comprises execution of the machine tool program by the machine tool controller. Matsumiya does not teach or suggest executing a machine tool program that includes instructions to control a machine tool to perform coordinate measurements. Instead, Matsumiya teaches a machine tool controller that only executes a machine tool program to machine a workpiece. For example, as stated in column 2, line 66 - column 3, line 4 of Matsumiya:

> In addition, the NC machining system according to the present invention may comprise the steps of producing a measurement program for measuring machining quality of a workpiece machined using a machine tool by a measuring machine through analyzing the NC program produced according to the method described above; measuring the machining quality of the workpiece using the produced measurement program and the measuring machine; and discriminating the machining quality of the workpiece by comparing the results of the machining quality of the workpiece measured by the measuring machine and the required machining quality information included in the NC program. (Emphasis added).

As shown, there is no suggestion whatsoever in Matsumiya that a machine tool controller execute a machine tool program that instructs a machine tool to perform coordinate

measurements. Therefore, withdrawal of the rejection of claim 58 is respectfully requested for at least this reason.

14. Dependent Claim 62

Claim 62 depends from claim 57 and recites that generating the machine tool program and analyzing coordinate measurement data generated by execution of the machine tool program are performed by an application integrated within a control panel of the machine tool controller. The Office Action points to Fig. 9 as teaching this feature. Neither Fig. 9 nor its description in the specification teach or suggest generating a machine tool program of any kind by an application integrated within a control panel of the machine tool controller. In fact, Fig. 1 and its description indicate that the NC program producing means (20) is separate from the NC apparatus (25). Accordingly, withdrawal of the rejection of claim 62 is respectfully requested for at least this reason in addition to the reasons already set forth above for claim 57.

15. Dependent Claim 65

Claim 65 is directed to the method of claim 63, which depends from claim 57, and recites that generation of a machine tool program comprises combining a machine tool definition with a dimensional metrology path definition. The Office Action states that Fig. 4A teaches this feature. Fig. 4A shows an NC machining program which includes tolerance information, but the machining program does not include a dimensional metrology path definition, nor is the machining program of Fig. 4A formed from a dimensional metrology path definition. Fig. 1 of Matsumiya shows a number of different inputs to NC Program Producing Means (20), but none of them includes a dimensional metrology path definition. Accordingly, Matsumiya does not teach or suggest combining a machine definition with a dimensional metrology path definition when generating a machine tool program. In addition to the reasons already set forth above for claims 57, withdrawal of the rejection of claim 65 is respectfully requested for the reasons set forth in this section.

16. Dependent Claim 69

Claim 69 is directed to the method of claim 57 and recites that the generation of a machine tool program comprises generating the machine tool program from a dimensional

metrology program. In column 4, lines 3-34, Matsumiya describes how NC program producing means (20) produces an NC program. This description does not include any teaching or suggestion whatsoever that the NC program is produced from a dimensional metrology program. As discussed above, Matsumiya is directed to producing a measurement program for a measurement machine using elements of an NC program. Accordingly, withdrawal of the rejection of claim 69 is respectfully requested for at least this reason in addition to the reasons already set forth above for claim 57.

17. Dependent Claim 70

Claim 70 is directed to the method of claim 69, which depends from claim 57, and recites that the generation of a machine tool program from a dimensional metrology program comprises removing dimensional metrology program commands from the dimensional metrology program. The Office Action states that Fig. 2 teaches this claim feature. The only possible dimensional metrology program shown in Fig. 2 is measurement program (50) which is not shown or described as having dimensional metrology program commands removed as part of generating a machine tool program. Accordingly, withdrawal of the rejection of claim 70 is respectfully requested for at least this reason in addition to the reasons already set forth above for claims 57 and 69.

18. Independent Claim 78

Claim 78 is directed to a system comprising means for generating a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller. The system also comprises a dimensional metrology analysis module to analyze coordinate measurement data generated by execution of the machine tool program. The NC program producing means (20) of Matsumiya produces a machine tool program for machining a workpiece, but does not produce a machine tool program including instructions to control a machine tool to perform coordinate measurements. Therefore, withdrawal of the rejection of claim 78 is respectfully requested.

19. Independent Claim 79 and Dependent Claims 80-83

Claim 79 recites a method including generating, from a dimensional metrology program, a self-contained machine tool program that is executable on a machine tool controller to perform coordinate measurements without interaction with a program generator. As discussed above, there is no teaching or suggestion whatsoever in Matsumiya of generating a machine tool program that is executable on a machine tool controller to perform coordinate measurements without interaction with a program generator. Accordingly, withdrawal of the rejections of claims 79-83 is respectfully requested.

20. Independent Claim 84 and Dependent Claim 85

Claim 84 is directed to a method of generating, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the act of generating the machine tool program is performed independently from any measurement data received from a machine tool controller. There is no reference in the Office Action to this claim limitation. Moreover, as discussed above, there is no teaching or suggestion whatsoever in Matsumiya of generating a machine tool program to control a machine tool to perform coordinate measurements. Therefore, withdrawal of the rejections of claims 84 and 85 is respectfully requested.

VIII. CLAIMS (37 C.F.R. §41.37(c)(1)(viii))

A copy of the claims involved in the present appeal is attached hereto as Appendix A.

IX. EVIDENCE (37 C.F.R. §41.37(c)(1)(ix))

No evidence pursuant to §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the Examiner is being submitted.

X. RELATED PROCEEDINGS (37 C.F.R. §41.37(c)(1)(x))

No related proceedings are referenced in Section II. above, hence no corresponding Appendix is included.

XI. CONCLUSION

For the reasons set forth above, Appellant respectfully requests that the Board of Appeals reverse the Examiner's final rejection under 35 U.S.C. §102(e) of claims 1-93.

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xx07/24/06xx

Respectfully submitted,

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APPENDIX A

Claims Involved in the Appeal of Application Serial No. 10/687861

1. A method comprising an act of:
(A) generating, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller.

2. The method according to claim 1, further comprising an act of:
(B) the machine tool controller executing the machine tool program to produce coordinate measurement data.

3. The method according to claim 2, further comprising an act of:
(C) communicating the coordinate measurement data to a dimensional metrology analysis module.

4. The method according to claim 3, wherein act (C) is performed during act (B).

5. The method according to claim 3, further comprising an act of:
(D) the dimensional metrology analysis module analyzing the coordinate measurement data.

6. The method according to claim 5, further comprising an act of:
(E) generating an additional machine tool program based on results of act (D).

7. The method according to claim 6, wherein the additional machine tool program comprises instructions to control a machine tool to perform coordinate measurements.

8. The method according to claim 6, wherein the additional machine tool program comprises instructions to control a machine tool to perform machining operations.

9. The method according to claim 6, wherein the additional machine tool program comprises instructions to control a machine tool to perform coordinate measurements and machining operations.

10. The method according to claim 5, wherein act (D) comprises the dimensional metrology analysis module analyzing the coordinate measurement data using overdetermined objective functions.

11. The method according to claim 1, wherein the dimensional metrology program is configured to control a coordinate measurement machine.

12. The method according to claim 1, further comprising an act of:
(F) communicating the machine tool program to the machine tool controller.

13. The method according to claim 12, wherein act (F) comprises communicating the machine tool program to the machine tool controller in one communication.

14. The method according to claim 1, wherein act (A) is performed by an application integrated within a control panel of the machine tool controller.

15. The method according to claim 1, wherein act (A) comprises an act of selecting one of a plurality of machine definitions, each machine definition providing values for one or more parameters of a machine tool.

16. The method according to claim 15, wherein the values comprise at least one of: a tool offset type; a parameterized move command; and a parameterized measure command.

17. The method according to claim 15, wherein act (A) comprises combining the machine definition with a dimensional metrology path definition.

18. The method according to claim 2, wherein act (B) comprises the machine tool controller executing the machine tool program without receiving further instructions during execution.

19. The method according to claim 2, wherein act (B) comprises the machine tool controller receiving one or more instructions regarding an offset value during execution of the machine tool program.

20. The method according to claim 1, wherein the machine tool program comprises G and M codes.

21. The method according to claim 1, wherein act (A) comprises translating the dimensional metrology program into the machine tool program.

22. The method according to claim 1, wherein act (A) comprises an act of removing dimensional metrology program commands from the dimensional metrology program.

23. The method according to claim 1, wherein act (A) comprises an act of inserting into the machine tool program numeric control commands that are not present in the dimensional metrology program.

24. The method according to claim 1, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding a type of analysis to be performed on measurement data that is generated by execution of the machine tool program.

25. The method according to claim 1, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding at

least one of an identification of the machine tool and an identification of the dimensional metrology program.

26. The method according to claim 1, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding identification of workpiece features to be analyzed.

27. The method according to claim 1, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding a quantity of coordinate measurements associated with a workpiece feature.

28. A system comprising:

a program generator to generate, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller.

29. The system according to system 28, further comprising an analysis module to perform dimensional analysis of coordinate measurement data that result from execution of the machine tool program.

30. The system according to claim 29, further comprising a server module to receive the coordinate measurement data from the machine tool controller and communicate the coordinate measurement data to the analysis module.

31. A computer-readable medium having instructions stored thereon that, as a result of being executed by a computer, instruct the computer to perform a method comprising an act of:

(A) generating, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller.

32. The computer-readable medium according to claim 31, wherein the method further comprises an act of:

(B) the machine tool controller executing the machine tool program to produce coordinate measurement data.

33. The computer-readable medium according to claim 32, wherein the method further comprises an act of:

(C) communicating the coordinate measurement data to a dimensional metrology analysis module.

34. The computer-readable medium according to claim 33, wherein act (C) is performed during act (B).

35. The computer-readable medium according to claim 33, wherein the method further comprises an act of:

(D) the dimensional metrology, analysis module analyzing the coordinate measurement data.

36. The computer-readable medium according to claim 35, wherein the method further comprises an act of: (E) generating an additional machine tool program based on results of act (D).

37. The computer-readable medium according to claim 36, wherein the additional machine tool program comprises instructions to control a machine tool to perform coordinate measurements.

38. The computer-readable medium according to claim 36, wherein the additional machine tool program comprises instructions to control a machine tool to perform machining operations.

39. The computer-readable medium according to claim 36, wherein the additional machine tool program comprises instructions to control a machine tool to perform coordinate measurements and machining operations.

40. The computer-readable medium according to claim 35, wherein act (D) comprises the dimensional analysis metrology module analyzing the coordinate measurement data using overdetermined objective functions.

41. The computer-readable medium according to claim 31, wherein the dimensional metrology program is configured to control a coordinate measurement machine.

42. The computer-readable medium according to claim 35, wherein act (D) comprises performing a regression analysis of the coordinate measurement data.

43. The computer-readable medium according to claim 31, wherein the dimensional metrology program is configured to provide adequate data for dimensional metrology analysis using overdetermined objective functions.

44. The computer-readable medium according to claim 31, further comprising an act of:

(F) communicating the machine tool program to the machine tool controller.

45. The computer-readable medium according to claim 44, wherein act (F) comprises communicating the machine tool program to the machine tool control in one communication.

46. The computer-readable medium according to claim 31, wherein act (A) is performed by an application integrated within a control panel of the machine tool controller.

47. The computer-readable medium according to claim 31, wherein act (A) comprises an act of selecting one of a plurality of machine definitions, each machine definition providing values for one or more parameters of a machine tool.

48. The computer-readable medium according to claim 31, wherein the machine tool program comprises G and M codes.

49. The computer-readable medium according to claim 31, wherein act (A) comprises an act of removing dimensional metrology program commands from the dimensional metrology program.

50. The computer-readable medium according to claim 31, wherein act (A) comprises an act of inserting into the machine tool program numeric control commands that are not present in the dimensional metrology program.

51. The computer-readable medium according to claim 31, wherein act (A) comprises an act of including indicators within the machine tool program, the indicators comprising information regarding a type of analysis to be performed on measurement data that is generated by an execution of the machine tool program.

52. The computer-readable medium according to claim 31, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding at least one of an identification of the machine tool and an identification of the dimensional metrology program.

53. The method according to claim 31, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding identification of workpiece features to be analyzed.

54. The method according to claim 31, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding a quantity of coordinate measurements associated with a workpiece feature.

55. A system comprising:

means for generating a machine tool program from a dimensional metrology program, the machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller; and

a communication module to communicate the machine tool program to the machine tool controller.

56. The system according to claim 55, further comprising means for analyzing coordinate measurement data resulting from execution of the machine tool program on the machine tool controller.

57. A method comprising acts of:

(A) generating a machine tool program that includes instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller; and

(B) analyzing coordinate measurement data generated by execution of the machine tool program using dimensional metrology analysis.

58. The method according to claim 57, further comprising an act of:

(C) the machine tool controller executing the machine tool program.

59. The method according to claim 58, further comprising an act of:

(D) receiving the coordinate measurement data on a computer during execution of the machine tool program.

60. The method according to claim 59, further comprising an act of:

(E) communicating the coordinate measurement data to a dimensional metrology analysis module.

61. The method according to claim 60, wherein the dimensional metrology analysis module performs analysis using overdetermined objective functions.

62. The method according to claim 57, wherein act (A) and act (B) are performed by an application integrated within a control panel of the machine tool controller.

63. The method according to claim 57, wherein act (A) comprises an act of selecting one of a plurality of machine definitions that each provide values for one or more parameters of a machine tool.

64. The method according to claim 63, wherein the values comprise at least one of: a tool offset type; a parameterized measure command; and a parameterized move command.

65. The method according to claim 63, wherein act (A) comprises combining the machine definition with a dimensional metrology path definition.

66. The method according to claim 58, wherein act (C) comprises the machine tool controller executing the machine tool program without receiving any external instructions during execution.

67. The method according to claim 58, wherein act (C) comprises the machine tool controller receiving external data regarding an offset value during execution of the machine tool program.

68. The method according to claim 57, wherein the machine tool program comprises G and M codes.

69. The method according to claim 57, wherein act (A) comprises generating the machine tool program from a dimensional metrology program.

70. The method according to claim 69, wherein act (A) comprises an act of removing dimensional metrology program commands from the dimensional metrology program.

71. The method according to claim 69, wherein act (A) comprises an act of inserting into the machine tool program numeric control commands that are not present in the dimensional metrology program.

72. The method according to claim 57, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding a type of analysis to be performed on measurement data that is generated by an execution of the machine tool program.

73. The method according to claim 57, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding at least one of an identification of the machine tool and an identification of a dimensional metrology program.

74. The method according to claim 57, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding identification of workpiece features to be analyzed.

75. The method according to claim 57, wherein act (A) comprises an act of providing indicators within the machine tool program, the indicators including information regarding a quantity of coordinate measurements associated with a workpiece feature.

76. A system comprising:

a program generator to generate a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller; and

a dimensional metrology analysis module to analyze coordinate measurement data generated by an execution of the machine tool program.

77. A computer-readable medium having instructions stored thereon that, as a result of being executed by a computer, instruct the computer to perform a method comprising acts of:

(A) generating a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller; and

(B) analyzing coordinate measurement data generated by an execution of the machine tool program using dimensional metrology analysis.

78. A system comprising:

means for generating a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program is executable on a machine tool controller; and

a dimensional metrology analysis module to analyze coordinate measurement data generated by execution of the machine tool program.

79. A method comprising an act of:

(A) generating, from a dimensional metrology program, a self-contained machine tool program that is executable on a machine tool controller to perform coordinate measurements without interaction with a program generator.

80. The method according to claim 79, further comprising an act of:

(B) downloading the machine tool program to the machine tool controller.

81. The method according to claim 80, further comprising an act of:

(C) executing the machine tool program on the machine tool controller.

82. The method according to claim 81, further comprising an act of:

(D) providing coordinate measurements resulting from execution of the machine tool program to a dimensional metrology analysis module.

83. The method according to claim 82, further comprising an act of:

(E) the dimensional metrology analysis module performing a dimensional metrology analysis of the coordinate measurements.

84. A method comprising an act of:

(A) generating, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein act (A) is performed independently from any measurement data received from a machine tool controller.

85. The method according to claim 84, further comprising an act of:

(B) applying a set of measurement instructions regarding part features to a data model of a part to generate the dimensional metrology program.

86. A method comprising acts of:

(A) generating, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements;

(B) providing at least one indicator within the machine tool program to be used by a dimensional metrology analysis module to analyze data generated by execution of the machine tool program.

87. The method according to claim 86, wherein act (B) includes providing at least one indicator within the machine tool program to be used by the dimensional metrology analysis module to initiate a type of analysis to perform on data generated by execution of the machine tool program.

88. The method according to claim 87, wherein the at least one indicator comprises information regarding a type of analysis to be performed on measurement data that is generated by an execution of the machine tool program.

89. The method according to claim 88, wherein the at least one indicator comprises information regarding at least one of an identification of a machine tool and an identification of the dimensional metrology program.

90. The method according to claim 89, wherein the at least one indicator comprises information regarding identification of workpiece features to be analyzed.

91. The method according to claim 86, wherein the at least one indicator comprises information regarding a quantity of coordinate measurements associated with a workpiece feature.

92. A computer-readable medium having instructions stored thereon that, as a result of being executed by a computer, instruct the computer to perform a method comprising acts of:

(A) generating, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements; and

(B) providing at least one indicator within the machine tool program to be used during dimensional metrology analysis to analyze data generated by execution of the machine tool program.

93. A system comprising:

a program generator to generate, from a dimensional metrology program, a machine tool program including instructions to control a machine tool to perform coordinate measurements, wherein the machine tool program comprises means for indicating to a dimensional metrology analysis module the type of analysis to be performed.